Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 47 (previously presented): A system for driving a direct-current (DC) motor under conditions of controlled DC current, from a DC voltage source of a value larger than said motor operating voltage, independently of the operating voltage of said motor, said system comprising:

a pair of nodes for connection of said DC motor, said nodes to be referred herein as the first node and the second node; said second node connected to a common electrical terminal of the system through an electrical path with low impedance, including low impedance to DC current; said DC motor is connected between said first node and said second node;

an inductive element to store energy and to act as a current source for said DC motor, said inductive element is external to said DC motor, and not part of said DC motor main magnetic circuit, said inductive element is connected to said first node, in series with said DC motor, said inductive element being capable of operating in a buck converter at the power level required to operate said DC motor and at the frequency of commutation of a first switch, the terminal of said inductive element not connected to said first node to be connected to a third node;

said first switch is connected to said inductive element at the third node, the terminal of said inductive element remote from said DC motor; said first switch used for connected and disconnecting said inductive element to a direct current (DC) voltage source; a terminal of said DC voltage source not connected to said first switch, to be connected to said common electrical terminal of the system; said first switch is a controlled switch capable of being turned off and on (switch open or closed) by control signals from a control system; said control system operates based on an error signal and a value of the desired operating current for said DC motor set externally to the system; the object of said control system is to turn said first

switch off and on (switch open or closed) in order to minimise said error signal and to keep the operating current of said DC motor at said desired value; said first switch is a single pole switch;

a second switch connected between said third node and said common electrical terminal of the system, parallel with a combination of said inductive element and said DC motor arranged in series; said second switch controlled so that a current circulating through said inductive element circulates through said second switch if said first switch is turned off (switch open) and disconnects said inductive element from said DC voltage source; said second switch is a single pole switch;

a capacitor arranged for connection in parallel with said DC motor to limit a resulting voltage over said DC motor, said capacitor being capable of operating in a buck converter at a power level required to operate said DC motor and at the frequency of commutation of said first switch, said capacitor is connected between said first node and a low impedance path to said common electrical terminal of the circuit;

a current sensor for measuring a current through said DC motor; the output of said current sensor connected to said control system of said first switch to generate said error signal for the operation of said control system controlling the operation of said first switch,

means for controlling operation of said second switch dependent upon the state of the first switch.

Claim 48 (previously presented): The system according to claim 47, wherein the voltage of said DC voltage source is larger than the nominal rated voltage of said DC motor.

Claim 49 (previously presented): A system for driving a direct-current (DC) motor under conditions of controlled DC current, independently of the operating voltage of said motor, said system comprising:

a pair of nodes for connection of said DC motor, said nodes to be referred to herein as the first node and the second node; said second node connected to a common electrical terminal of the system through an electrical path with low impedance, including low impedance of DC current; said DC motor is connected between said first node and said second node;

a capacitor arranged for connection in parallel with said motor to limit a resulting voltage over said motor, one terminal of said capacitor connected to said first node the other terminal of said capacitor to be connected through a low impedance to said common terminal of the system, said capacitor being capable of operating in a buck converter at the power level required to operate said DC motor and at the frequency of commutation of a first switch;

an inductive element with one terminal connected to said common terminal of the system through a low impedance path, the other terminal of said inductive element, referred to herein as the third node, is connected to said first switch; said inductive element is used to store energy and to act as a current source for said DC motor, said inductive element being external to said DC motor, and not part of the said DC motor main magnetic circuit, said inductive element being capable of operating in a buck converter at the power level required to operate said DC motor and at the frequency of commutation of said first switch;

said first switch is connected to said inductive element in the third node, said first switch used for connecting and disconnecting said third node to a DC voltage source; a terminal of said DC voltage source not connected to said first switch, to be connected to said common electrical terminal of the system; said first switch being a controlled switch capable of being turned off and on (switch open and closed) by control signals from a control system; said control system operates based on an error signal and a value of a desired operating current for said DC motor, set externally to the system; the object of said control system is to turn said first switch off and on (switch open and closed) in order to minimise said error signal and to keep the operating current of said DC motor at said desired value; said first switch is a single pole switch;

a second switch connected between said first node and said third node, that is, in series with the parallel combination of said motor and said capacitor, and connected to the common node between the first switch and said inductive element; said second switch controlled so that a current circulating through said inductive element circulates through said second switch if the first switch is turned off (switch opened) and disconnects the third node from said DC voltage source; said second switch is a single pole switch;

a current sensor for measuring a current through said DC motor; the output of said

current sensor connected to said control system of said first switch to generate said error signal for the operation of said control system, controlling the operation of said first switch, and

means for controlling operation of said second switch dependent upon the state of the first switch.

Claim 50 (previously presented): A system for driving a direct-current (DC) motor under conditions of controlled DC current, independently of the operating voltage of said motor, said system comprising:

a pair of nodes for connection of said DC motor, said nodes to be referred to herein as the first node and the second node, said DC motor is connected between said first and said second node;

a capacitor arranged for connection in parallel with said motor, between said first node and said second node, to limit a resulting voltage over said motor, said first node, connected to a terminal of said capacitor and said motor, being also connected to a DC voltage source, said capacitor being capable of operating in a buck converter at the power level required to operate said DC motor and at the frequency of commutation of a first switch; the other terminal of said DC voltage source to be connected to a common electrical terminal of the system;

an inductive element with one terminal connected to said first node, a common node of said DC voltage source, said capacitor and said DC motor, the other terminal of said inductive element, referred to herein as the third node and is connected to said first switch; said inductive element used to store energy and to act as a current source for said DC motor, said inductive element being external to said DC motor, and not part of the said DC motor main magnetic circuit, said inductive element being capable of operating in a buck converter at the power level required to operate said DC motor and at the frequency of commutation of said first switch;

said first switch is connected to said inductive element in the third node, the other terminal of said first switch, not connected to the third node is connected to said common electrical terminal of the system through an electrical path with low impedance, including low

impedance to DC current; said first switch used for connecting and disconnecting the third node to said common electrical terminal of the system; said first switch being a controlled switch capable of being turned off and on (switch open and closed) by control signals from a control system; said control system operates based on an error signal and a value of a desired operating current for said DC motor set externally to the system; the object of said control system is to turn said first switch off and on (switch open and closed) in order to minimise said error signal and to keep the operating current of said DC motor at said desired value; said first switch is a single pole switch;

a second switch connected between said second and said third node, said second switch controlled so that a current circulating through said inductive element circulates through said second switch if the first switch is turned off (switch opens) and disconnects the third node from said common electrical terminal of the system; said second switch is a single pole switch;

a current sensor for measuring a current through said DC motor; the output of said current sensor connected to said control system of said first switch to generate said error signal for the operation of said control system, controlling the operation of said first switch; and

means for controlling operation of said second switch dependent upon the state of the first switch.

Claim 51 (previously presented): The system according to claim 47, wherein said second switch is a diode connected with appropriate polarity so that current circulating through said inductive element circulates through said diode if said first switch is open, disconnecting said inductive element.

Claim 52 (previously presented): The system according to claim 47, wherein said second switch is an electronic switch for synchronous rectification connected with appropriate polarity so that current circulating through said inductive element circulates through said electronic switch if said first switch is open, disconnecting said inductive element.

Claim 53 (previously presented): The system according to claim 47, wherein said first switch is an electronic switch.

Claim 54 (previously presented): A system for driving a direct-current (DC) motor under conditions of a controlled average current, a voltage of a DC power supply having a larger or smaller value than a motor nominal voltage, said system comprising:

an inductive element for connection in series with the DC motor, said inductive element capable of operating in a buck converter at the power level required to operate said DC motor and at the frequency of a first switch;

an arrangement including a plurality of switches, diodes and a magnetic system, said arrangement coupled to said inductive element for connecting and disconnecting a terminal of said inductive element remote from said motor to a voltage source, said arrangement configured as circuit selected from the group consisting of:

- a forward DC-DC converter
- a push-pull DC-DC converter
- a half-bridge DC-DC converter
- a diagonal-half bridge DC-DC converter
- a full bridge DC-DC converter

a capacitor arranged for connection in parallel with said motor to limit a resulting voltage over the motor, said capacitor capable of operating in a buck converter at the power level required to operate said DC motor and at the frequency of commutation of said first switch;

means for measuring a current through the motor; and

means for controlling operation of said arrangement dependent upon said measured current in the motor.

Claim 55 (previously presented): The system according to claim 47, wherein said inductive element is an inductor, or a winding of a transformer.

Claim 56 (previously presented): The system according to claim 47, wherein a current through the inductive element can be controlled independently from a current through the motor, the balance of electrical charge being accumulated or taken from the capacitor in parallel with the motor.

Claim 57 (previously presented): The system according to claim 47, wherein a current through the inductive element is modulated as a full wave rectified sinusoid synchronous with the AC main voltage so that the power factor of the system, as a load to the AC main is improved.

Claim 58 (previously presented): A system for driving a direct-current (DC) motor under conditions of a controlled average current, a voltage of a DC power supply having a larger or smaller value than a motor nominal voltage, said system comprising:

a diode;

a magnetic transformer connected in series with said diode in a circuit arrangement selected from the group consisting of a flyback DC-DC converter and a ringing choke DC-DC converter, said transformer and said diode for connection in series with the DC motor;

a switch coupled to said magnetic transformer and said diode for connecting and disconnecting a terminal of said magnetic transformer and said diode remote from said motor to a voltage source;

a capacitor arranged for connection in parallel with said motor to limit a resulting voltage over the motor, said capacitor capable of operating in a buck converter at the power level required to operate said DC motor and at frequency of commutation of said switch;

means for measuring a current through the motor; and

means for controlling operation of said switch dependent upon said measured current in the motor.

Claim 59 (previously presented): The system according to claim 58, wherein said switch is an electronic switch.

Claim 60 (previously presented): A system for driving a direct-current (DC) motor under conditions of a controlled average current, a voltage of a DC power supply having a larger or smaller value than a motor nominal voltage, said system comprising:

an electronic synchronous rectification switch;

a magnetic transformer connected in series with said synchronous rectification switch in a circuit arrangement selected from the group consisting of a flyback DC-DC converter and a ringing choke DC-DC converter, said transformer and said synchronous rectification switch for connection in series with the DC motor;

a switch coupled to said magnetic transformer and said synchronous rectification switch for connecting and disconnecting a terminal of said magnetic transformer and said synchronous rectification switch remote from said motor to a voltage source;

a capacitor arranged for connection in parallel with said motor to limit a resulting voltage over the motor;

means for measuring a current through the motor; and

means for controlling operation of said switch dependent upon said measured current in the motor.

Claim 61 (previously presented): The system according to claim 60, wherein said switch is an electronic switch.

Claim 62 (previously presented): The system according to claim 58, wherein a current through the flyback inductance can be controlled independently from a current through the motor, the balance of electrical charge being accumulated or taken from the capacitor in parallel with the motor.

Claim 63 (previously presented): The system according to claim 58, wherein a current through the flyback inductance is modulated as a full wave rectified sinusoid synchronous with the AC main voltage so that the power factor of the system, as a load to the AC main is improved.

Claim 64 (previously presented): The system according to claim 47, further comprising a DC motor.

Claim 65 (previously presented): The system according to claim 64, wherein said DC motor includes a brush-less DC motor.

Claim 66 (previously presented): The system according to claim 65, wherein said DC motor includes an electronic commutator for said brush-less DC motor.

Claim 67 (previously presented): The system according to claim 47, wherein said means for measuring said current through the motor includes means for calculating said current through the motor dependent upon current measured in another part of said system.

Claim 68 (previously presented): The system according to claim 47, wherein a frequency of a pulse width modulated waveform, resulting from operation of said switches, is randomized to facilitate EMI compliance.

Claim 69 (withdrawn): An airflow apparatus, comprising:

a brush-less DC motor;

an electronic circuit for controlling operation of said brush-less DC motor;

a power supply for said electronic circuit separate from a power supply for said brush-less DC motor, said power supply for said electronic circuit adapted to use a voltage resulting from said brush-less DC motor in operation once said resulting voltage reaches a suitable value; and

means for reducing power to said electronic circuit from said power supply once said resulting voltages reaches said suitable value.

Claim 70 (withdrawn): The airflow apparatus according to claim 69, wherein said apparatus is an airflow generator.

Claim 71 (withdrawn): The airflow apparatus according to claim 70, wherein said airflow generator is for use in medical applications.

Claim 72 (withdrawn): The airflow apparatus according to claim 69, wherein said reducing means comprises means for disconnecting said electronic circuit from said power supply for said control electronics.

Claim 73 (withdrawn): The airflow apparatus according to claim 69, wherein said electronic circuit comprises an electronic commutator or driving electronics for said brush-less DC motor.

Claim 74 (withdrawn): The airflow apparatus according to claim 69, wherein said electronic circuit comprises a buck converter or down converter switched mode power supply connected to a rectified AC main voltage.

Claim 75 (withdrawn): The airflow apparatus according to claim 69, wherein said electronic circuit comprises means for controlling current through said brush-less DC motor.

Claim 76 (withdrawn): The airflow apparatus according to claim 69, wherein said electronic circuit utilizes a pulse width modulated square wave applied through a transformer to control a voltage over said motor.

Claim 77 (withdrawn): The airflow apparatus according to claim 76, wherein said transformer is part of a forward converter, a push-pull converter, a half bridge converter, a diagonal half bridge converter, a bridge converter, or a flyback converter.

Claim 78 (withdrawn): The airflow apparatus according to claim 69, further comprising a driving system wherein said electronic circuit controls a current through said brush-less DC motor (BLDCM), where said inductive element is a winding of a transformer having a plurality of secondary windings, a secondary winding being sued to provide power to said electronic circuit.

Claim 79 (withdrawn): The airflow apparatus according to claim 69, wherein said airflow generator is for use as a cooling fan or a ventilation fan.

Claim 80 (withdrawn): The airflow apparatus according to claim 79, wherein a plurality of brush-less DC motor-driven ventilation fans or cooling fans are connected in series between each other.

Claim 81 (withdrawn): A system for intermittently powering a microprocessor based system from a DC voltage higher than the voltage required by the system to operate, comprising:

a capacitor;

means to charge said capacitor from the DC voltage with a current substantially smaller than the current the microprocessor based system needs to operate;

a switch coupled to said capacitor so that said switch can connect power to the microprocessor based system from the charge accumulated in the capacitor;

means for sensing the voltage in the capacitor and causing the switch to close once the voltage in said capacitor reaches a desired value; and

means for keeping the switch closed while the voltage in said capacitor is over a desired value, but less than the value that caused said sensing means to close the switch.

Claim 82 (withdrawn): The system according to claim 81, wherein said switch is an electronic switch.

Claim 83 (withdrawn): The system according to claim 81, further comprising means for limiting current through said switch.

Claim 84 (previously presented): The system according to claim 56 wherein the current through the motor is calculated from the variation of the voltage across the capacitor in parallel with the motor.

Claim 85 (previously presented): The system according to claim 57, wherein the instant in which the sinusoidal waveform of the AC main crosses zero is sensed to synchronise the modulation performed to the current through the inductive element with the waveform in the AC main.

Claim 86 (previously presented): The system according to claim 47, wherein the voltage over the DC motor is used to estimate the speed of the motor.

Claim 87 (withdrawn): A switching based alternating current (AC) to direct current (DC) converter, comprising:

a rectifier adapted to be connected to an alternating current (AC) mains line, said rectifier having at least one output comprising two nodes, to be referred to herein as the output common node and the input common node;

a first capacitor for noise reduction connected between said output common node and said input common node;

an inductive element connected to said output common node;

a first switch connected between said input common node and the terminal of said inductive element not connected to said output common node; said first switch used for connecting and disconnecting a terminal of said inductive element remote from said output common node, the connected node between said inductive element and said first switch to be referred to herein as the first node;

a second switch connected to said first node, controlled so that the current circulating through said inductive element circulates through said second switch when said first switch disconnects said inductive element from said input common node, the node of the second switch not connected to said first node to be referred to herein as the DC output node;

a second capacitor for energy storage connected between said DC output node and said output common node;

means for sensing a current through said inductive element;

means for sensing the voltage across said first capacitor;

means for sensing the voltage across said second capacitor, the voltage across said second capacitor to be referred to herein as the output voltage;

a control circuit using the sensed value of the voltage across said first capacitor, and the sensed value of the output voltage, said control circuit connected to said first switch to maintain said output voltage between defined limits by operating said first switch in a way that said current through said inductive element tracks the waveform of the alternating current line

voltage, to cause said switching based AC to DC converter to exhibit unity power factor to the alternating current line.

Claim 88 (withdrawn): The converter defined in claim 87, wherein said second switch is a diode.

Claim 89 (withdrawn): The converter defined in claim 87, wherein said first switch comprises a field effect transistor.

Claim 90 (withdrawn): The converter defined in claim 87, wherein said rectifier comprises a full-wave diode rectifier.

Claim 91 (withdrawn): The converter defined in claim 87, wherein said inductive element is an inductor, or a winding of a transformer.

Claim 92 (withdrawn): The converter defined in claim 87, wherein a frequency of a pulse width modulated waveform controlling said first switch or said second switch, resulting from operation of said switches, is randomized to facilitate EMI compliance.

Amendments to the Drawings:

Attached hereto is a formal set of drawings comprising 68 sheets for Fig. 1 through Fig. 17F as originally filed. It is requested that the attached formal drawings be substituted for the drawings as originally filed.

Attachment: Replacement Sheets